

Remarks

Reconsideration and allowance of this application, as amended, are respectfully requested.

The written description portion of the specification and the abstract of the disclosure have been amended. Claims 1-17 have been canceled without prejudice, and new claims 18-39 have been added. Claims 18-39 are now pending in the application. Claims 18 and 31 are independent. The rejections are respectfully submitted to be obviated in view of the amendments and remarks presented herein. No new matter has been introduced through the foregoing amendments.

The specification has been editorially amended for conformance with 37 CFR § 1.77(c), for consistency, and to correct any informalities. The abstract has been editorially amended for conformance with 37 CFR § 1.72(b). New claims 18-39 have been added in response to the rejection under 35 U.S.C. § 112, second paragraph, and to further define the scope of protection sought for Applicant's invention. Entry of each of the amendments is respectfully requested.

35 U.S.C. § 103(a) – Bieler, Minoshima, and Brocheton

Claims 1-17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,456,512 to Bieler et al. (hereinafter "Bieler") in view of JP 09-192659 of Minoshima and

further in view of U.S. Patent No. 6,048,812 to Brocheton et al. ("Brocheton").

The rejection of claims 1-17 under § 103(a) based on Bieler, Minoshima, and Brocheton is respectfully deemed to be obviated. For at least the following reasons, the combined disclosures of Bieler, Minoshima, and Brocheton would not have rendered obvious the invention defined by any of Applicant's presently pending claims 18-39.

First, the asserted combination of Bieler, Minoshima, and Brocheton does not disclose each feature of the claimed invention. By way of review, a problem with prior art UV radiation systems is that no system having a plurality of lamps is described. And, the lamps disclosed in the prior art are not mounted generally parallel to the flow direction of the water that is being irradiated. This means that the contaminated water is not subjected as intensely as possible to the irradiated UV radiation.

The aforementioned drawbacks associated with prior art UV radiation systems are solved by Applicant's invention. A technical problem that is solved by Applicant's invention may be regarded as providing an apparatus for purifying contaminated water using high-pressure UV lamps which are both durable and which intensely irradiate the water. Accordingly, instant claim 18 reads as follows:

An apparatus for purifying contaminated water by photochemical oxidation, comprising a flow channel through which at least a sub-flow of water is directed and in which the water is irradiated with UV electromagnetic radiation from an array of a plurality of UV lamp assemblies, each of said UV lamp assemblies including a high-pressure UV halogen lamp which is mounted generally parallel with a flow direction in the channel and a tubular UV absorber disposed around each lamp.

As the examiner acknowledges, Bieler "does not teach that each of said UV lamp assemblies include a high-pressure UV halogen lamp with the flow direction in the channel and that the lamp assemblies include a tubular UV absorber around each lamp" (Office Action page 3). That is, claim 18 differs from Bieler in that the water is irradiated with UV electromagnetic radiation from an array of a plurality of UV lamp assemblies. Each of the claimed UV lamp assemblies includes a high-pressure UV halogen lamp, which is mounted generally parallel with the flow direction in the channel. The lamp assemblies also include a tubular UV absorber around each lamp.

The technical advantages of having a plurality of lamps are several. One advantage is that a more intense UV radiation of the water may be achieved. However, one potential drawback associated with such a configuration is that the radiation from the UV lamps varies as the radiated UV light from one lamp may be reflected to a neighboring lamp and the radiation from the lamps will be disturbed. As a result, the contaminated water flow can be subjected to the resulting unpredictable wavelengths associated

with the UV radiation interference. This means that a high intensity in a very specific range of wavelength cannot be fully achieved. Furthermore, the service life of the UV lamps is very low since the radiation from the other lamps contributes to the deterioration of the UV lamps. In the prior art, the aforementioned disadvantages of providing a plurality of lamps adjacent each other are not acknowledged.

According to the present invention, the aforementioned problems are solved by providing a high pressure UV halogen lamp, which is mounted generally parallel to the flow direction so that the water is subjected to radiation for a longer distance per lamp, just as the water flow is less restricted than if the lamps were generally orthogonal to the flow direction. This in itself is advantageous since the number of lamps that is required can be reduced.

Moreover, the solution according to Applicant's claimed apparatus involves a tubular absorber around the UV lamp. This eliminates the problem of radiation interference. And, since the absorber is tubular, it does not cause excessive flow resistance in the water.

The disclosure of Minoshima does not rectify the deficiencies of Bieler. Minoshima may disclose a UV lamp, but fails to teach Applicant's claimed feature of a "high-pressure UV halogen lamp which is mounted generally parallel with a flow direction in the channel."

The disclosure of Brocheton does not rectify the deficiencies of Bieler and Minoshima. Furthermore, Brocheton may disclose a "brown glass which absorbs ultraviolet radiation," but fails to teach i) that the absorber is tubular and ii) that the tubular UV absorber is disposed around each lamp in an array of a plurality of UV lamp assemblies, as defined by Applicant's claim 18.

Second, there is no teaching in any of the asserted references that would have led one to select the references and combine them in a way that would produce the invention defined by any of Applicant's pending claims. Bieler is directed to a photochemical reactor with a plurality of capillary tubes, not Applicant's apparatus and method for purifying water. More specifically, the object of Bieler's apparatus is to reduce "the thickness of the container wall and of the body of fluid which must be penetrated by the irradiation" (column 2, lines 56-61; see Figure 1). Minoshima's focus is securing an oxidation catalyst to a wall of a tank in order to oxidize a substance more efficiently (paragraphs [0009] and [0010]). Brocheton's focus is the properties of a brown glass which absorbs ultraviolet radiation. Therefore, even if one skilled in the art did come to realize the shortcomings of the prior art UV radiation systems, he would not look to Minoshima and Brocheton to rectify the deficiencies of Bieler in an attempt to arrive at Applicant's claimed invention.


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Accordingly, the combined disclosures of Bieler, Minoshima, and Brocheton would not have rendered obvious the invention defined by Applicant's pending apparatus claim 18 and method claim 31. Dependent apparatus claims 19-30 and method claims 32-39 are similarly allowable.

In view of the foregoing, this application is now in condition for allowance. If the examiner believes that an interview might expedite prosecution, the examiner is invited to contact the undersigned.

Respectfully submitted,

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